forest officers and subordinates admired and honoured him.

He married, in 1876, Mary, eldest daughter of the late Dr. Briscoe, civil surgeon of Cooch Behar, in Bengal, and leaves one son, a lieutenant in a Ghurka regiment, and two daughters. By his death the Empire loses an enthusiastic forester, who can ill be spared at the present time.

NOTES.

WE regret to see the announcement of the death on November 11, at sixty-two years of age, of Prof. Jules Tannery, the distinguished French mathematician.

COUNCILLOR WIEHL has just bequeathed, says the *Revue scientifique*, the whole of his fortune, of about a million crowns, to the Bohemian Academy of Sciences at Prague to encourage scientific and technical research.

A SHORT time ago it was suggested that the Eiffel Tower should be used as a station for the daily transmission of time-signals to ocean-going vessels by means of wireless telegraphy. The Paris correspondent of the *Times* reports that this service was inaugurated on November 21 with satisfactory results. In future, time-signals will be sent out twice daily, at 11 a.m. and 12 midnight. Three signals will be made on each occasion at two-minute intervals. The morning transmission will not, however, take place on Sundays and holidays.

THE Earl of Stair has accepted the presidency of the Royal Scottish Geographical Society in succession to Prof. James Geikie, F.R.S., who has held the office of president for the last six years. The anniversary meeting of the society was held on November 11, and was addressed by Sir John Murray, K.C.B., F.R.S., who chose for his subject "The Deep Sea." Before the address Prof. Geikie was presented with the society's gold medal in recognition of his distinguished services to geographical science, and Sir John Murray with the Livingstone medal in recognition, not merely of his prolonged and valuable oceanographical research, but also in commemoration of the completion of the great national work "The Bathymetrical Survey of the Fresh-water Lochs of Scotland."

IN the interests of precision in scientific diction, a correspondent asks that the familiar expression "thunder and lightning" should be inverted in accordance with the natural sequence of cause and effect, and become "lightning and thunder." He adds:—"I never could grasp how the confusion originated, considering that, in agreement with the transmission of light and sound, the flash is seen before the thunder is heard."

THE eighty-fifth Christmas course of experimentally illustrated lectures adapted to a juvenile auditory, to be given at the Royal Institution by Prof. Silvanus P. Thompson, F.R.S., promises to be of exceptional interest. The subject is "Sound, Musical and Non-musical." The dates and subjects of individual lectures are:—1910, December 29, production of sound; December 31, transmission of sound; 1911, January 3, reception of sound; January 5, combination of sounds; January 7, registration of sounds; January 10, reproduction of sound.

AT a meeting of the executive committee of the British Science Guild, held on November 16, on the motion of Mr. A. Moseley, C.M.G., it was decided to form a special combined education committee to deal, in the first instance, with education of the governing classes of England. It was resolved to defer the circulation of the synchronisation report until a later date. It was decided to consider further the reduction of the rate of postage on scientific literature. It was also suggested that the annual meeting should in future be held in the month of April, and that the annual dinner should, if convenient, be held on the same day.

WE regret to announce the death, at sea, at the age of thirty-one, of Mr. Richard Froude Tucker, Archæological Surveyor of the Northern Circle, India. Mr. Tucker held the post of curator of the Delhi Museum, and the catalogue of the archæological collections deposited there was recently prepared by him in collaboration with Dr. J. Ph. Vogel. Appended to this catalogue is a memoir by Mr. Tucker on the elephant statues at the Delhi Gate of the Delhi Fort. The untimely death of this promising archæologist is a severe loss to antiquarian research in India.

DURING the summer of this year excavations were carried on, under the superintendence of Dr. Felix Oswald, at the site of the Roman station of Margidunum on the Fosse Way, midway between Leicester and Lincoln. Some local pottery, Samian ware, coins of Victorinus, Carausius, Constans, and Eugenius, dated between 265 and 395 A.D., have been discovered. The main feature of the finds was the relative abundance of iron objects, such as swords, knives, a bolt of a spring-lock, rings, and nails. A skeleton of an old man and three infants was associated with bones of the Celtic ox (*Bos longifrons*) and other domesticated animals. These antiquities have been deposited in the museum at Nottingham Castle, where it is hoped they may form the nucleus of a Romano-British section.

THE Rome correspondent of the *Times* announces that a decree was published on November 20 creating a commission to examine the view that pellagra is produced by a protozoal infection conveyed by an insect, and to formulate any changes in the existing law of protection that may be considered desirable. The commission consists of nine members, all doctors with the exception of Prince Teano, deputy, who was chiefly instrumental in directing the attention of the Italian Government to the work of the English Pellagra Investigation Committee. An article upon the investigations made by Dr. Sambon for this committee appeared in NATURE of October 27.

ON November 12 an extension of the natural history section of the Hull Public Museums was opened by Mr. T. S. Taylor, Mayor of Hull. In the ornithological section of the museum there is an unusually extensive collection of British birds. The extension consists of three large rooms, the largest of which is occupied by a collection of British birds containing more than 900 specimens. In the second room is a collection of local mammals, including the group of otters, badgers, stoats, weasels, and so on. The third room contains a collection of skeletons—animals and birds. The museum is fortunate in having been presented with the collection of birds formed by the late Sir Henry Boynton. This collection consists of about 200 cases containing 450 birds.

ATTENTION has already been directed in NATURE to the scheme of the British Empire League for the erection in London of a memorial to Captain Cook. We are glad to notice that the secretaries of the Royal Society have written to Lord Brassey, the honorary treasurer of the fund, expressing, on behalf of the Royal Society, approval of the scheme, and enclosing a subscription of twenty-five guineas from the society. Their letter includes the following paragraph:—"We are instructed to express the gratification of the Royal Society that public opinion has at

length taken form in this direction, to the extent that there is now a prospect of a memorial which shall be not inadequate to the merits and renown of this great explorer. As the circular issued by your committee states, the Royal Society was closely connected with the initiation of these famous voyages, with the selection of Captain Cook to the command, and with the working up and publication of the results of the expeditions. Many of its Fellows, including Sir Joseph Banks, one of Cook's companions in his first voyage, afterwards for many years president of the Royal Society, took a prominent part in that work; and the society still retains in its possession memorials of this connection."

UNDER the heading "Earthquakes in the Pacific," the *Times* of November 17 published a statement by Mr. J. J. Shaw, of West Bromwich, that there was evidence the ocean depths of the Pacific are in a state of great unrest. Mr. Shaw said that his seismograph recorded shocks at 8 a.m. on Monday, November 14, and at midnight and between 2 and 3 p.m. on Tuesday, November 15, all at a great distance. In reply to an inquiry as to these reported disturbances, Prof. Milne has sent us from Shide the following records of earthquakes in October and November:—"Although a few small earthquakes were recorded in October, the month was one of earth rest. During the first two weeks of November seismic activity was somewhat pronounced. The dates on which records were obtained, followed by the times of commencement and maximum movement in hours and minutes, were as follows:—November 6, 19.18 and 21.23; November 9, 6.16 and 7.50 or 8.5; November 14, 7.35 and 8.34; November 14, 19.58 and 20.27; November 15, 0.31 and 10.45, 6.1 and 6.21, 7.42 and 7.46, 9.16 a maximum, and, lastly, 14.35 and 15.21. The second of these was the largest, having an amplitude of 7 mm., which means that tiltings of 2·2″ occurred. The time employed is G.M.T. civil, or midnight=0 or 24h."

AT the first Optical Convention, held in 1905, a permanent committee was appointed, to which was entrusted the task of deciding upon a suitable date for the holding of a second convention, and of taking the necessary steps to initiate it. A general meeting of the committee and of members of the optical industry, representatives of optical bodies and societies, and others interested in optical questions, will be held on Tuesday, November 29, to consider and discuss proposals for the organisation of a second convention. The chair will be taken by Dr. R. T. Glazebrook, C.B., F.R.S., director of the National Physical Laboratory, as chairman of the permanent committee, and all interested are invited to be present at the meeting. The main features of the scheme which the members of the existing executive committee have in view, and the principal questions on which it seems necessary, at this general meeting, specially to invite discussion, are in broad outlines as follows:—(1) an exhibition of optical and allied instruments; (2) the preparation of a catalogue of optical and allied instruments of British manufacture to serve as a convenient work of reference for all users of optical and scientific instruments, not necessarily to be limited to instruments actually exhibited; (3) the holding of meetings for the reading of papers and for discussions and demonstrations on optical subjects; (4) the publication of a volume of Proceedings, in which these papers will be collected together.

WE regret to see the announcement of the death, on November 16, of Dr. J. F. Payne, emeritus librarian to the Royal College of Physicians, and the author of valuable medical works and many other contributions to science. From an obituary notice in the *Times* we learn that Dr. Payne was born on January 10, 1840, and took his degree at Oxford in 1862 with first-class honours in natural science. In 1863 he obtained the Burdett-Coutts scholarship in geology, and in 1865 the Radcliffe travelling scholarship. In accordance with the regulations of the Radcliffe scholarship he went abroad, spending some time in Paris and in Berlin, and proceeding later to Vienna. On his return to this country Dr. Payne was appointed examiner in natural science at Oxford, demonstrator of morbid anatomy and curator of the museum to St. Mary's Hospital. It was about this time that he revised, enlarged, and edited Jones and Sieveking's "Manual of Pathology." In 1871 he went to St. Thomas's Hospital, being appointed lecturer successively in general pathology, materia medica, forensic medicine, and finally on the principles and practice of medicine. About nine years ago he was appointed consulting physician to this hospital. In 1873 Dr. Payne was appointed to deliver the Gulstonian lecture of the Royal College of Physicians, and in later years he gave the Lumleian and the FitzPatrick lectures. In 1879, when the plague was prevalent in Russia, and the college was consulted by the British Government, they appointed Dr. Payne to accompany Surgeon-Major Colvill as commissioners to investigate and report on the disease. He became a Fellow of the Pathological Society in 1869, and was afterwards a councillor, a member of the morbid growth committee, secretary from 1880–2, vice-president from 1888–9, and president in 1897. He was twice president of the Epidemiological Society, choosing for his first inaugural address the subject of "Tuberculosis as an Endemic Disease," and on the second occasion "The History of Epidemiology in England." He was also president of the Dermatological Society, and was vice-president of the Royal Medical and Chirurgical Society in 1906. Dr. Payne was the author of "A Manual of Pathological Anatomy" and "Observations on some Rare Diseases of the Skin," and the life of Thomas Sydenham in the "Masters of Medicine" series.

THE Eugenics Education Society has distributed a special "Poor Law number" of the *Eugenics Review*, which is devoted to the eugenic aspect of Poor Law reform. The number contains a report of a committee of the society appointed to consider the reform of the Poor Law from this particular point of view; reviews by Dr. C. S. Loch and Mr. Sidney Webb, respectively, of the majority and minority reports of the Poor Law Commission; and a most valuable article, by Mr. E. J. Lidbetter, the General Relieving Officer of the Bethnal Green Union, on some examples of Poor Law eugenics. Of the report of the committee, the third section is the most important. Through the kindness of various boards of guardians, the committee has been allowed access to workhouse records, and, where necessary, personal interviews with paupers; three extensive pedigrees of pauperised families are in course of construction, and the most complete of these is now published, the chart being supplemented by a key giving detailed particulars of the cases included. The chart covers five generations, and indicates the intermarriage of five pauper families. Mr. Lidbetter's investigation supplements this report of the committee by some thirteen charts of pedigrees based on his personal investigation. The society and Mr. Lidbetter deserve unreserved commendation for carrying out such researches, which must have required much prolonged and laborious work. It is no reflection on the work if we add that it still remains a most difficult problem to determine, on the

basis of such data, the relative parts played by heredity in the strict sense of the term, continuity of environment, and example. We gather from an accompanying letter that the society finds it impossible, from lack of funds, to proceed with such investigations on any sufficient scale, and urges the formation of a Departmental Committee with power to examine records.

AT the recent conversazione of the Geologists' Association, held at University College, Gower Street, a series of worked flints from the Ipswich district was exhibited. The circumstances in which they were unearthed indicate that they are probably the oldest works of man yet discovered in this country. They are well chipped, deep brown and cream in colour, and several show scratches which may be the glacial striæ imprinted when they formed part of the gravel at the base of a glacier. Technically speaking, they are of pre-Crag age, that is to say, they long precede the Glacial period. Mr. W. Whitaker, F.R.S., who mapped the district for the Geological Survey, is satisfied that they come from undisturbed beds, and that the gravel from which the flints were obtained is of pre-Crag Age. This discovery, if it stands the criticism to which it will certainly be exposed, marks a memorable advance in the prehistoric anthropology of this country.

IN the October issue of *Man* Mr. D. Alexander gives an account of a performance of a Nigerian Punch and Judy show, which in some ways resembles the drama which is familiar to us. A forked stick is thrust into the ground, the performer kneels, and, taking off his black gown, throws it over the stick, the opening for the head of the wearer serving to provide a space for the display and withdrawal of the figures. The conversation between the puppets is carried on, as in the European performance, in a squeaky tone. The place of origin of this play is somewhat uncertain, but there seems to be no doubt that it is an indigenous invention. In the same issue of *Man* Captain A. J. N. Tremearne discusses the system of bull-fighting among the Fulani, a race of cattle breeders in northern Nigeria, who seem to be of Berber origin. In contrast to the conditions of the sport in Spain or Portugal, the Nigerian variety is comparatively tame, no horses being used, the performers being unarmed, and the bulls escaping any kind of injury.

To the *Irish Naturalist* for November Dr. Scharff communicates an article on the whale-fishery which has been carried on by Norwegians during the last three years at Inishkea, and for a rather shorter period at Ely Point, on the Mayo coast. At the former station 124 whales have been taken during the last two seasons, most of these being rorquals, although five black right-whales, of an estimated value of between 1500*l.* and 3000*l.*, were captured in 1908. A single blade of the whalebone of this species is worth about two guineas, and the total yield of this substance may be as much as a quarter of a ton, with a value of about 400*l.*

IN a pamphlet on the distribution and migration of North American shore-birds, issued by the U.S. Department of Agriculture as Bulletin No. 35, Mr. W. W. Cooke emphasises the economic importance of this group. For many years the abundance of larger birds, such as swans, geese, and ducks, caused the waders to be neglected, but with the killing off of the former gunners directed their attention to the latter, which now stand in need of immediate protection. In addition to their value as food, the plovers and some others do valuable service as destroyers of noxious insects, while all the members of the group are of special interest from an æsthetic point of view. Details of the distribution and migrations of the various species form the bulk of the pamphlet.

IN the October issue of the *Irish Naturalist* Mr. A. Williams directs attention to the presence of sanderlings during the last three years on the shores of Dublin Bay throughout July, a month when these birds are generally supposed to be residing in the far north for the purpose of breeding. These July birds are evidently non-breeders—either old or barren—but it has yet to be determined whether they remained in Ireland when the bulk of their kind winged their way northwards, or whether they were the first of the main body to return south. During their sojourn in Ireland these non-breeders undergo a considerable change in plumage. "They have been found with the red colouring entirely absent, and also the soft grey margins of the feathers, which conceal the nuptial plumage in spring, completely worn away, and in some instances the ruddy coloration faded out, causing the birds to present a totally changed and misleading appearance."

THE Manchester Museum is one of the most flourishing of the provincial museums in this country, and its report for the year 1909–10 is good evidence that there has been no falling off in its usefulness and no disposition to interfere with its healthy and regular growth. During the year Mr. W. M. Tattersall has succeeded Dr. Hoyle as keeper of the museum. The number of additions to the collections has been large in every department, and the library has been considerably strengthened during the year.

THE first issue of the *Naturalist*, the journal of the Natal Scientific Society, has been received. We understand that this scientific periodical is the only one of its kind published in South Africa. It is edited by Mr. R. Denley James, and, in addition to containing the society's transactions and proceedings, includes several articles. Among the latter may be mentioned notes on the life-history of the Pseudacræa by Mr. A. D. Millar, and a short note on the Ixodidæ by the editor. The syllabus of work which the society hopes to accomplish during the present session shows that most branches of science are to receive attention, and that already the society has received gratifying support.

THE decay of building stones was discussed by Dr. Tempest Anderson at the recent Museum Conference at York, and his address is published in the October number of the *Museums Journal*. After showing that stone-decay is not due to wind action, the opinion is expressed that "it is not a surface action at all, but, I believe, a decay or rot affecting the substance of the stone, and, like other decays and rots, is in every probability caused by the action of some low organism, like the moulds and fungi which rot wood, canvas, and other vegetable materials. About two years ago, to test this view and endeavour to find a cure, as all efforts based on the abrasion or chemical theories had failed, I had affected stones treated with various germicides, and the stones which have since best resisted the decay were those treated with sulphate of copper (5 per cent. solution), bichloride of mercury, and creosote."

THE specimens of beaked whales (Ziphiidæ) in the collection of the United States National Museum form the subject of a profusely illustrated monograph, by Mr. F. W. True, published by the Smithsonian Institute as Bulletin No. 73. On account of the rarity of these cetaceans—exclusive, of course, of the bottle-nosed whale—the memoir

has an exceptional value to the students of the group, more particularly since the U.S. National Museum possesses, so far as the author could ascertain, about one-fourth of the whole available material. Of the genera Mesoplodon, Ziphius, and Berardius, Mr. True could find records of only about one hundred specimens in collections, of which more than half belong to the first genus, Berardius being known only by about fourteen examples. The most important addition to our knowledge of the group in recent years was the discovery of representatives of all three genera at Bering Island by Dr. Stejneger, two of these being regarded as distinct species, one of which was named in 1883 and the other in 1885. About six years ago it was ascertained that the range of the Bering Sea forms extends to the eastern North Pacific. After a descriptive catalogue of the specimens in the Washington Museum, with notices of some examples in other American collections, the author concludes his memoir with a list of the recognisable existing species of the group. Inclusive of the two representatives of Hyperoödon, this list embraces thirteen species.

THE November number of the *Quarterly Journal of Microscopical Science* (vol. lv., part iv.) contains a very interesting paper by Miss Muriel Robertson and Prof. E. A. Minchin on the division of the collar-cells of the calcareous sponge *Clathrina coriacea*. It appears that these cells multiply by longitudinal fission, the division of the nucleus being accompanied by a typical mitosis. The chief interest attaches to the behaviour of the "blepharoplast" in this process. In the resting cell this organ appears as a "basal granule" in connection with the flagellum; in mitosis it behaves as a typical "centrosome," dividing into two parts, which cave to lie at opposite poles of the nuclear spindle. Each of these daughter centrosomes becomes the blepharoplast of one of the daughter cells, and a new flagellum grows out from it. Around each new flagellum a new collar develops, the old collar and flagellum of the mother cell completely disappearing. The authors discuss the bearing of these facts upon the vexed question of the interpretation of the "kinetonucleus" in trypanosomes, and conclude that the latter is a true nuclear body, and not a blepharoplast or centrosome.

THE destruction of agricultural plant pests by chemical means is reviewed by Mr. H. C. Long in *Knowledge* (November). The practice is based on direct experiment, as plants differ considerably in their resistance to chemical solutions; thus charlock and dandelions are readily attacked by a copper sulphate solution, while *Cnicus arvensis* and clover are much more resistant. According to Bolley, shepherd's purse, *Camellina sativa*, chickweed, corn-cockle, bindweed, and plantain are all amenable to chemical treatment, whereas sow-thistle, *Bromus secalinus*, wild oats, and couch grass cannot be effectively controlled. The author directs attention to the desirability of carrying out systematised experiments in different parts of the country.

AN account of the Arnold Arboretum, well known by name to British botanists, is contributed by Mr. W. J. Bean to the *Kew Bulletin* (No. 8). Situated in a suburb of Boston, U.S.A., and extending over 200 acres, it is noted for the large collection of trees and shrubs in which north-east American and north Asiatic species predominate. A marked feature in the arboretum is the ground cover of shrubs in place of grass around the trees; various species of Vaccinium, Aster, Rubus, and other native shrubs are grown in this way. Mr. Bean pays a warm tribute to the energetic director, Prof. C. S. Sargent, for the excellent work that is being carried on; one of his greatest tasks has been the elucidation of North American species of Cratægus, of which specimens from type plants occupy 15 acres. A monumental work was provided by the "Silva of North America," in fourteen volumes, and another massive publication that will shortly appear is a bibliography of trees and shrubs of the world. Incidentally, the *Bulletin* contains evidence of cordial cooperation between Prof. Sargent and Kew in the publication of a list of new species of Impatiens from China, forwarded to Sir Joseph Hooker by Prof. Sargent for description.

THE report of the chief inspector of mines of the native State of Mysore for the year 1908 has just been issued, and affords satisfactory evidence that mining operations are being conducted here with energy and skill as well as with due attention to the safety of those engaged in the work. A small amount of manganese and chrome ore is being raised, but the principal mining operations are, as heretofore, confined to the Kolar goldfield. The report shows that there were ten companies at work of which seven were producing gold, the value of the bullion produced being just over 2,000,000*l.* sterling, or almost exactly the same as in the previous year. The quartz raised contains gold to the value of just about 3*l.* per ton, the working costs amounting to about one-half of this figure. Elaborate tables are attached to the report, those relating to accidents being especially interesting. The accident death-rate is given as 4·70 per 1000 persons employed below ground, a figure which, though necessarily varying a good deal from year to year, shows upon the whole a downward tendency. A comparison with the similar figure for the Transvaal goldfields is decidedly in favour of the Kolar field, although in the Transvaal the accident death rate per 100,000 tons of quartz treated is less than in Mysore, due to the greater efficiency of the Kaffir as compared to the Indian miner. In the Mysore there are about 4000 persons employed for each ton of quartz crushed, as against about 1000 in the Transvaal. A good deal of space in the report is devoted to a discussion of the "air-blasts and quakes," or violent bumps of ground, due apparently to the sudden relief of the strains in the ground as mining proceeds. These bumps have caused a good many serious accidents, and up to the present no means of preventing them has yet been suggested. It is to be hoped that a further study of this intricate question may lead at any rate to a determination of the conditions under which they are likely to occur, this being the first step towards taking measures to minimise the dangers resulting from them.

ON assuming his extraordinary professorship at the National University at Utrecht, Dr. E. van Everdingen delivered an interesting address, on October 17, upon "The Third Dimension in Meteorology." The establishment of a separate chair for meteorology was, he thought, an admission that it was now considered worthy of taking a place among the older sciences. If we inquired in what direction it had developed in the last twenty years, the answer undoubtedly was, in the third dimension: height. After glancing at the history of meteorology from the earliest times, he referred to the great importance of Buys Ballot's work in investigating simultaneous weather conditions and in formulating his law of the relation of wind to air-pressure, which is still the corner-stone of practical meteorology, and had infused new life into the subject. He discussed in considerable detail the various methods employed, and the valuable results obtained in the investigation of the upper air by (1) manned balloons; (2) kites; (3) captive balloons; (4) registering balloons (with instru-

ments); and (5) pilot balloons (without instruments). The use of Assmann's aspirating-psychrometer in manned balloons, and his employment of rubber both in registering and pilot balloons in lieu of paper, have proved of the greatest value. The author shows that much new light has been thrown upon questions relating to the general circulation of the atmosphere by the important discovery of the inversions of temperature at great heights and the existence of the isothermal layer, not only in our latitudes, but also in polar and tropical regions. At moderate heights these inversions play an active part in thunderstorm phenomena.

THE October number of *Himmel und Erde* contains an account of a popular lecture on the present position of wireless telegraphy, delivered six months ago by Dr. Karl Strecker, of the Imperial Post Office, Berlin. The account is well illustrated by diagrams, and is one of the best popular introductions to the subject we have seen. The author commences with the up-and-down oscillations of a weight supported by a spring, and the property such an arrangement has of setting in oscillation a similar arrangement suspended from the same beam as the first. By simple steps he passes to the oscillations of electricity in two conducting rods separated by a spark-gap, and to the way in which a duplicate apparatus at a distance will pick up the oscillations. The defects of the earlier apparatus are explained, and it is shown how in succession the means of detection of the oscillations and the means of producing them have been improved by the introduction of the coherer and by the utilisation of the oscillations produced by a cooled electric arc. Even the problem of privacy is not overlooked, and it seems the author considers rapid and prearranged changes of frequency of the oscillations as the future solution of the difficulty.

THE discovery by Messrs. Cotton and Mouton three years ago that a liquid may be rendered double refracting by the action of a magnetic field redirected attention to the Kerr effect, and as a result we now have theories which attempt to explain both effects. Prof. Voigt in his "Magneto- und Elektro-Optik" traces them to a direct effect of the electric or magnetic field on the electromagnetic oscillations which constitute light, while Prof. L. Natanson, in the June number of the Bulletin of the Academy of Sciences of Cracow, treats them as due to the directive action of the field on the electrons oscillating within the molecules. In the September number of *Le Radium* Prof. Langevin extends his theory of magnetisation so as to cover the two effects. According to him, the molecules of the liquid have axes along which the polarisation is an electric, and the magnetic moment in a magnetic field have values which differ from those in directions at right angles. Æolopropy of the molecule once secured, either on Prof. Natanson's or Prof. Langevin's theory, the investigation of the effects proceed along lines similar to those of Dr. T. H. Havelock's Royal Society paper of 1907, and leads to results in agreement with observation—that the amount of the double refraction is proportional to the square of the field, and the dispersion is expressed by Cauchy's formula.

AN interesting paper on the development of road locomotion in recent years was read by Mr. L. A. Legros at the Institution of Mechanical Engineers on Friday, November 18. It is difficult to realise the enormous increase in the use of the cycle both for pleasure and business purposes. It is estimated that about one person in every fifteen of the entire population of the United Kingdom is a cyclist. Post Office cycles cover a distance of 10,000 miles per annum per machine. The total number in use for postal purposes is 11,400. It is noteworthy that in the total mileage which has been run since the service was instituted, viz. about 600,000,000 miles, no fatal accident has occurred by the failure of any portion of a bicycle. The author estimates that the various public service horsed vehicles in London will become extinct as follows:—the horse-tramcar at the end of 1912; the horse-omnibus at the end of 1913; the hansom cab at the end of 1913; the four-wheel horse-cab before the end of 1921. The paper contains many useful suggestions regarding the management of traffic in London streets.

AN illustrated article on the removing of the wreck of the Quebec Bridge appears in the *Engineer* for November 18. The contract for clearing the site was awarded last December to Messrs. Charles Koenig and Co., of Quebec, and about half the quantity, viz. 5000 tons, has now been removed. A large amount of cutting has had to be done, and the choice of either dynamite or oxyacetylene for cutting a member is governed very largely by local conditions. Where the latter method has been used to greatest advantage has been in cutting up the heavy chords and posts into pieces that could be handled by the derricks, which have a capacity of not more than 10 tons. One web, 4 feet 6 inches deep, with a section of 190 square inches, was cut in 20½ minutes with a consumption of 112 cubic feet of gas. In cutting eyebars it was found that with a stream of pure oxygen gas one square inch of metal could be cut, on an average, in 5⅝ seconds, with a consumption of 0·4 cubic foot of gas, at a cost of 1·2 cents for the oxygen gas. Since the beginning of operations some 50,000 cubic feet of gas have been consumed, or an average of 10 cubic feet per ton of material removed.

MESSRS. SCHOTT AND GEN, of Jena, have sent us a copy of a well-illustrated catalogue of the new Jena glass laboratory requisites they are now in a position to supply. Extracts are published in the catalogue from a report from the Imperial Physico-Technical Institute, Charlottenburg, made after subjecting the new ware to various tests, and they indicate that these requisites, in comparison with older Jena glasses, have an increased power of resistance to sudden changes of temperature combined with a reduction of the amount of alkali given off into aqueous fluids.

OUR ASTRONOMICAL COLUMN.

THE TOTAL ECLIPSE OF THE MOON, NOVEMBER 16.—Not for many years have the conditions for observing a total eclipse of the moon been so generally favourable as they were on November 16. Reports from all over the country show how generally they were taken advantage of and appreciated, although, of course, no details of special scientific interest are yet published. Several meteors were observed before and during the eclipse, Mr. E. A. Martin having observed one at 6h. 55m. p.m. from South Norwood. Its path was from north-west to south-east, its colour reddish-yellow, and it was especially noticeable by reason of its extremely leisurely movement. Two faint meteors travelling in the same direction were seen from Gunnersbury during the eclipse. Madam de Robeck, writing from Naas, Ireland, states that the eclipse was a beautiful spectacle, and that she saw three meteors. One of these was a fine specimen, which travelled in a south-westerly direction from an apparent radiant just below the eclipsed moon. The penumbral shadow was barely discernible until after 10 p.m., when the relative darkening of the south-east limb could be detected. A slight flattening of the limb appeared to take place some minutes before the actual shadow could be seen on the disc, and throughout the eclipse the various prominent